Forest Sciences

Prince Rupert Forest Region

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Does Soil Resettling Occur After Decompaction?

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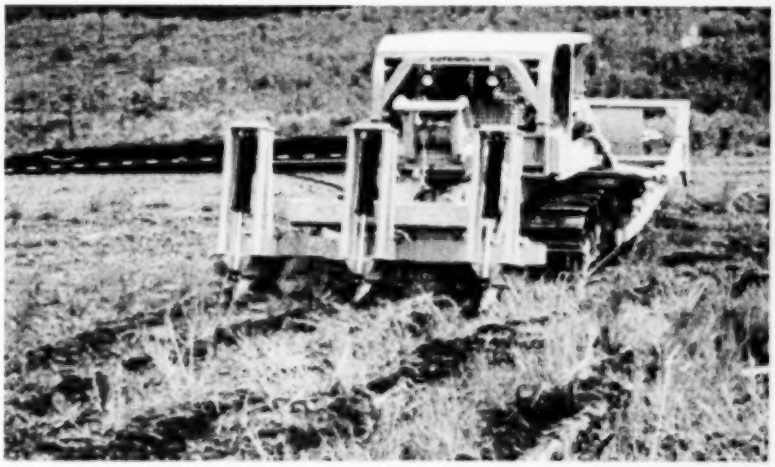

Figure 1. The winged subsoiler in action.

The winged subsoiler can be quite effective in reducing compaction in landings, as discussed in a previous extension note (#17). But are medium-textured soils prone to resettling over time, thus negating the benefits of decompaction? In this note I will examine and discuss any changes in physical soil properties that occurred after two years on well-shattered soils from reclaimed landings.

Methods

In 1995, Pacific Inland Resources attempted to reclaim over 60 landings in the Telkwa River chart area. Most of the landings had loam textured soil with the occasional sandy-loam or clay-loam texture as well. We monitored twelve of these landings to examine the effectiveness of subsoiling and changes in soil properties over time. We laid 5-m long transects across areas of well shattered soil, classified as 'high' in the initial study. These soils had a high degree of surface shatter, with an indistinguishable trench due to the furrow slice collapsing back together. Sub-surface shatter created by the subsoiler wings also loosened the soil

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between the furrows. We measured bulk density and aeration porosity at three positions along the transect, 10 to 20 cm away from the furrow slices. Soil cores were used to sample at three depths in each position: 0-5 cm, 10-15 cm, and 20-25 cm. We also determined depth of shatter by using a steel probe to find the maximum depth of penetration every 20-30 cm along the transect. Depth of penetration was measured on the low (poor shatter), medium (average shatter) and high (good shatter) transects from the original study (Extension Note 17).

Results and Discussion

The average bulk density, aeration porosity (macropores) and penetration depth were very similar after two years, suggesting that no significant resettling had occurred following decompaction (Table 1). Bulk density and aeration porosity are still in an acceptable range for tree growth, which should allow for the root inputs and microbial activity needed to recover soil productivity. Penetration depths on low- and medium-shattered soils had not improved, so the results emphasize the need to have proper decompaction from the start.

The concerns over soil resettling following decompaction might be partly due to visual changes in the soil surface after a short period of time. Initially, we were able to distinguish between poor and good subsoiler results from the size of the furrow and surface soil displacement. But after two years, the surface soil had often resettled to the point where the poor and good subsoiler results were indistinguishable. Rain and snow likely 'melts' the displaced soil around the furrows back to a more even surface. In addition, the soil surface often looks similar across landings because water infiltration creates a uniform thin, dense, crusted layer where silts and clays have plugged soil pores. Crusting of the soil surface might have a detrimental effect on vegetation growth, and could be better managed with high vegetation cover to hold surface fines in place.

Table 1. Changes in soil properties after two years.

Soils of high shatter	1995	1997
Bulk density (g/cm^3)	1.19	1.12
Aeration porosity (%)	12	14
Probe depth (cm)		
High soil shatter	34	31
Medium soil shatter	27	26
Low soil shatter	16	18

The landing reclamation work demonstrated the need for proper use of the winged subsoiler, so as to achieve consistent and effective soil decompaction. It was reassuring to find no resettling of soils on these loam-textured landings, which indicates that reclamation treatments can be effective in helping to re-establish site productivity on degraded sites.

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